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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/047,978	01/13/2002	Steven Teig	SPLX.P0089	5041

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EXAMINER	
WHITMORE, STACY	

ART UNIT	PAPER NUMBER
2812	

DATE MAILED: 06/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/047,978	TEIG ET AL.	
	Examiner	Art Unit	
	Stacy A Whitmore	2812	

-- The MAILING DATE of this communication appears on th cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *26 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *27-52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *27-34,38-45 and 47-52* is/are rejected.

7)☒ Claim(s) *35-37, and 46* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *10/31/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *See Continuation Sheet.*

Continuation of Attachment(s) 6). Other: IDSs 10/1/04, 11/10/03, 11/14/03 .

FINAL ACTION

1. Examiner has reviewed IDSs dated 10/1/03, 10/31/03, 11/10/03, 11/14/03, and 3/26/04. Currently an IDS dated 4/21/03 is listed in the application, however, no references are cited with the IDS.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Examiner acknowledges applicant's reference to claims 47-52 as being computer readable medium claims having similar limitations as rejected claims 27-34, and 38-45. The subject matter of those claims being rejected in the prior office action although examiner did not specifically point out the claim numbers.

4. Claims 27, 38, 47, and 50 are rejected under 35 U.S.C. 102(e) as being anticipated by Scepanovic et al. (US Patent 6,058,254).

5. As for claims 27 and 38, Scepanovic '254 discloses the invention as claimed, including a method/ computer readable medium storing a computer program of routing a plurality of nets in a region of an integrated circuit ("IC") layout, each net having a set of pins in the region, the method comprising:

partitioning the region into several sub-regions, wherein a plurality of edges/paths exist between said sub-regions [fig. 4, sub-regions are the boxes identified by e.g. (j=0, I=0) or (j=0, I=1); col. 5, lines 25-27];

for each particular net, identifying an edge-intersect/path-use probability for each particular edge/path that specifies the probability that a set of potential routes for the particular net will intersect/use the particular edge/path, wherein a potential route for a particular net traverses the set of sub-regions that contain the particular net's set of pins [fig. 4; col. 5, line 25 – col. 6; fig. 3, and col. 3; the net 116-118 crosses sub-regions]; and

using the identified edge-intersect/path-use probabilities to identify routes for the nets [col. 5, lines 1-18; the probability use used to form a better routing solution].

6. Claims 27-34, and 38-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang(US Patent 5,784,289) in view of Scepanovic et al. (US Patent 6,058,254).

7. As for claims 27, 38, 47, and 50, Wang '289 discloses the invention substantially as claimed, including a method/ computer readable medium storing a computer program of routing a plurality of nets in a region of an integrated circuit ("IC") layout, each net having a set of pins in the region, the method comprising:

partitioning the region into several sub-regions, wherein a plurality of edges/paths exist between said sub-regions [fig.'s 8-10];

for each particular net, identifying an edge-intersect/path-use probability for each particular edge/path that specifies the probability that a route for the particular net will intersect/use the particular edge/path, wherein a potential route for a particular net traverses the set of sub-regions that contain the particular net's set of pins [abstract; col. 2, line 65 – col. 3, line 11; col. 6, lines 43-67, especially lines 45-48 – here the wiring probability is shown to be the probability of the wiring passing through one edge; col. 7 – two pin nets]; and

using the identified edge-intersect/path-use probabilities to identify routes for the nets [col. 6, lines 23-46].

Wang did not specifically disclose a set of potential routes traverses the set of sub-regions.

Scepanovic disclosed a set of potential routes traverses the set of sub-regions [col. 5 – col. 6, line 5].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wang and Scepanovic because adding Scepanovics set of potential routes traversing the set of sub-regions would have improved Wang's method by allowing for quick routing which would save time for routing and save time for overall circuit design [see Scepanovic, col. 5, lines 1-14].

8. As for claims 28, 39, 48, and 51, Wang '289 disclosed wherein, for each particular net, the edge-intersect/ path-use probability for each particular edge/path equals the number of potential routes of the particular net that intersect/use the particular edge/path divided by the number of potential routes of the particular net [col. 6, especially lines 63-65].

9. As for claim 29, 40, 49 and 52, Wang '289 disclosed wherein identifying the edge-intersect/path-use probabilities for each particular net comprises:

identifying the set of sub-regions that contain each particular net's pins [abstract];

based on each particular net's identified set of sub-regions, retrieving the particular net's edge-intersect/path-use probabilities from a storage structure [abstract and col. 11, lines 1-12: the set of routes are retrieved from a storage structure because the program used to obtain them resides as a software program which is stored on a storage structure].

10. As for claim 30 and 41, Wang '289 disclosed wherein identifying the edge-intersect/path-use probabilities comprises:

for each particular net:

identifying the set of potential routes for the particular net [abstract];

for each particular edge/path, computing the number of potential routes of the particular net that intersect/use the particular net/path [abstract; col. 6];

dividing the computed number of each particular edge/path by the number of potential routes of the particular net [abstract; col. 6].

11. As for claim 31 and 42, Wang '289 disclosed wherein identifying the set of potential routes for each particular net comprises retrieving the set of routes from a storage structure [col. 11, lines 1-12: the set of routes are retrieved from a storage structure because the program used to obtain them resides on a software program which is stored on a storage structure].

12. As for claim 32 and 43, Wang '289 disclosed wherein identifying the set of potential routes for each particular net comprises generating the set of routes after partitioning the IC region [abstract; col.'s 5-6].

As for claim 33 and 44, Wang '289 disclosed for each particular edge/path, computing a sum of the probabilities identified for the particular edge/path for all the nets [col. 6, lines 54-56];

using the summed probabilities for the edges/paths to predict congestion of the edges/paths [col. 6, lines 63-67; col. 7, lines 1-4];

routing the nets based on the predicted congestion of the edges/paths [col. 11, lines 1-12].

13. As for claim 34 and 45, Wang '289 disclosed wherein using the identified probabilities to identify routes for the nets comprises:

using the edge-intersect/path-use probabilities to predict congestion of the edges/paths [col. 6];

based on the predicted congestion, identifying routes for nets [col. 6].

14. Claims 35-37 and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to disclose either singularly or in combination using the potential routes and the edge-intersect/path-use costs to formulate a linear-programming ("LP") problem; and

solving the LP problem to identify one route for each net.

Applicant's arguments filed March 26, 2004 have been fully considered but they are not persuasive.

In the remarks section on pages 2-5, applicant argues in substance that Wang in view of Scepanovic or Scepanovic does not disclose

partitioning the region into several sub-regions, wherein a plurality of edges/paths exist between said sub-regions;

for each particular net, identifying an edge-intersect/path-use probability for each particular edge/path that specifies the probability that a set of potential routes for the particular net will intersect/use the particular edge/path, wherein a potential route for a particular net traverses the set of sub-regions that contain the particular net's set of pins; and

using the identified edge-intersect/path-use probabilities to identify routes for the nets.

And more specifically:

A method that for each net identifies for each edge an edge-intersect probability that specifies the probability that a set of potential routes for the net will intersect the edge.

Examiner respectfully disagrees for the following reasons:

I. Wang in view of Scepanovic discloses:

partitioning the region into several sub-regions, wherein a plurality of edges/paths exist between said sub-regions [fig.'s 4, 8-10; col. 5, lines 29-50, the IC is partitioned for a routing grid];

for each particular net, identifying an edge-intersect/path-use probability for each particular edge/path that specifies the probability that a route for the particular net will intersect/use the particular edge/path, wherein a potential route for a particular net traverses the set of sub-regions that contain the particular net's set of pins [abstract; col. 2, line 65 – col. 3, line 11; col. 6, lines 43-67, especially lines 45-48 – here the wiring probability is shown to be the probability of the wiring passing through one edge; col. 7 – two pin nets; additionally, col. 6, lines 34-65, Wang discloses that the probability of a net passing through an edge is calculated for an edge in each bounding box]; and

using the identified edge-intersect/path-use probabilities to identify routes for the nets [col. 6, lines 23-46, col. 8, lines 14-40 shows that the probabilities are used to identify routes].

Wang did not specifically disclose a set of potential routes traverses the set of sub-regions.

Scepanovic disclosed a set of potential routes traverses the set of sub-regions [col. 5 – col. 6, line 5, and additionally col. 4, line 63 – col. 5, line 5, Scepanovic discloses a set of potential routes going through the "piece" or region].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wang and Scepanovic because adding Scepanovics set of potential routes traversing the set of sub-regions would have improved Wang's method by allowing for quick routing which would save time for routing and save time for overall circuit design [see Scepanovic, col. 5, lines 1-14].

And more specifically:

A method that for each net identifies for each edge an edge-intersect probability that specifies the probability that a set of potential routes for the net will intersect the edge

[col. 6, lines 34-65, Wang discloses that the probability of a net passing through an edge is calculated for an edge in each bounding box: also Scepanovic discloses col. 4, line 63 – col. 5, line 5, Scepanovic discloses a set of potential routes going through the "piece" or region which is - a method that for each net identifies for each edge an edge-intersect probability that specifies the probability that a set of potential routes for the net will intersect the edge].

II. Scepanovic discloses:

partitioning the region into several sub-regions, wherein a plurality of edges/paths exist between said sub-regions [fig. 4, sub-regions are the boxes identified by e.g. (j=0, I=0) or (j=0, I=1); col. 5, lines 25-27: also col. 3, lines 30-35 dislcoses the partitioning into regions];

for each particular net, identifying an edge-intersect/path-use probability for each particular edge/path that specifies the probability that a set of potential routes for the particular net will intersect/use the particular edge/path, wherein a potential route for a particular net traverses the set of sub-regions that contain the particular net's set of pins [fig. 4; col. 5, line 25 – col. 6; fig. 3, and col. 3; the net 116-118 crosses sub-regions: additionally Scepanovic discloses col. 4, line 63 – col. 5, line 5, Scepanovic discloses a set of potential routes going through the "piece" or region which is - a method that for each net identifies for each edge an edge-intersect probability that specifies the probability that a set of potential routes for the net will intersect the edge]; and

using the identified edge-intersect/path-use probabilities to identify routes for the nets [col. 5, lines 1-18; the probability use used to form a better routing solution].

And more specifically:

A method that for each net identifies for each edge an edge-intersect probability that specifies the probability that a set of potential routes for the net will intersect the edge.